

Chapter 4

Graphing Quadratic Functions

9. What is the maximum value of $y = -2x^2 + 4x + 3$?

- A. ~~(2, -13)~~ B. ~~(-1, -3)~~ C. (1, 5) D. ~~(4, 12)~~

$$\frac{-b}{2a} = \frac{-4}{2(-2)} = 1$$

20. A quadratic function is written as $y = (x + 3)(x - 2) - 2$.

a. Write the function in standard form.

$$y = x^2 + x - 6 - 2$$

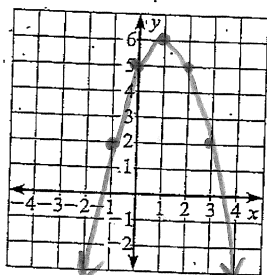
$$y = x^2 + x - 8$$

b. What is the axis of symmetry on the graph of this function?

$$\frac{-1}{2(1)} = -\frac{1}{2}$$

$$x = -\frac{1}{2}$$

21. Sketch a graph of the function $y = -x^2 + 2x + 5$.



$$\frac{-2}{2(-1)} = 1$$

x	y
-1	2
0	5
1	6
2	5
3	2

28. Factor the expression $x^2 - 3x - 54$.

$$(x - 9)(x + 6)$$

29. What is the factored form of the expression $g^2 - 4$?

- A. $(g - 2)(g - 2)$ B. $(g - 2)(g + 2)$ C. $(g - 4)(g - 4)$ D. $(g - 4)(g + 4)$

30. The area of the rectangle with width $(x - 5)$ centimeters and length $(x + 9)$ centimeters is 32 square centimeters. What are the dimensions of the rectangle?

$$\begin{aligned}(x-5)(x+9) &= 32 \\ x^2 + 4x - 45 &= 32 \\ x^2 + 4x - 77 &= 0\end{aligned}$$

$$\begin{aligned}(x+11)(x-7) &= 0 \\ \cancel{x = -11} \quad x &= 7\end{aligned}$$

$$\boxed{2 \text{ cm} \times 16 \text{ cm}}$$

31. What are the zeros of the function $y = x^2 + 2x - 24$?

$$(x+6)(x-4) = 0$$

$$\boxed{x = -6 \quad x = 4}$$

33. Solve the equation $12x^2 - 5x - 2 = 0$.

$$\begin{aligned}12x^2 - 8x + 3x - 2 &= 0 \\ 4x(3x-2) + 1(3x-2) &= 0 \\ (4x+1)(3x-2) &= 0\end{aligned}$$

$$\boxed{x = -\frac{1}{4} \quad x = \frac{2}{3}}$$

34. Which factorization of $6p^2 + p - 5$ is correct?

~~A. $(2p+5)(3p-1)$~~

~~C. $(p+5)(6p-1)$~~

~~B. $(2p+1)(3p-5)$~~

D. $(p+1)(6p-5)$

For Exercises 37–40, simplify the expression.

37. $\frac{4}{2-\sqrt{5}}$

$$\frac{4(2+\sqrt{5})}{(2-\sqrt{5})(2+\sqrt{5})}$$

$$\boxed{\frac{8+4\sqrt{5}}{4-5}}$$

38. $\sqrt{75}$

$$\boxed{\frac{\sqrt{25}\sqrt{3}}{5\sqrt{3}}}$$

39. $\sqrt{12} \cdot \sqrt{21}$

$$\sqrt{4}\sqrt{3} \cdot \sqrt{21}$$

$$\boxed{\frac{2\sqrt{9}\sqrt{7}}{2 \cdot 3\sqrt{7}}}$$

40. $\sqrt{\frac{5}{9}}$

$$\boxed{\frac{\sqrt{5}}{3}}$$

41. What is the product of $6 - \sqrt{3}$ and its conjugate?

A. 33

B. 27

C. 9

D. 3

$$(6 - \sqrt{3})(6 + \sqrt{3})$$

$$36 - 6\sqrt{3} + 6\sqrt{3} - 3$$

$$\boxed{33}$$

23. The graph of the function $y = 2(x - n)(x - 3)$ has its vertex at the point $(-2, -50)$. What is the value of n in this function?

A. -7

B. -1

C. 1

D. 7

$$-50 = 2(-2 - n)(-2 - 3)$$

$$-50 = 2(-2 - n)(-5)$$

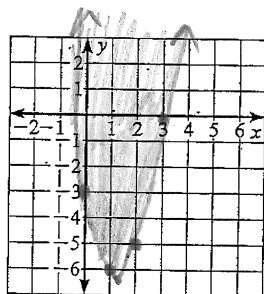
$$-50 = -10(-2 - n)$$

$$5 = -2 - n$$

$$7 = -n$$

$$\boxed{n = -7}$$

25. Graph $y = 2x^2 - 5x - 3$. Then solve the inequality $2x^2 - 5x - 3 \geq 0$ using your graph.

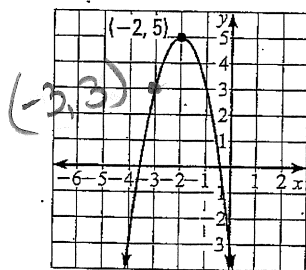


$$\frac{5}{2(2)} = \frac{5}{4}$$

x	y
0	-3
1	-6
1.25	-6.125
2	-5
3	0

$$x = -1 \quad x = 3$$

26. Write a quadratic function in vertex form for the parabola shown.



$$y = a(x - h)^2 + k$$

$$3 = a(-3 + 2)^2 + 5$$

$$3 = a + 5$$

$$a = -2$$

$$\boxed{y = -2(x + 2)^2 + 5}$$

For Exercises 42–44, write the expression as a complex number in standard form.

42. $(7 + 2i) - (3 - 4i)$

$$4 + 6i$$

43. $5i(8 - 2i)$

$$40i - 10i^2$$

$$10 + 40i$$

44. $(6 + i)(4 - 3i)$

$$24 - 18i + 4i - 3i^2$$

$$27 - 14i$$

50. Which equation has exactly one solution?

A. $3x^2 + 5x + 7 = 0$

B. $3x^2 + 2x - 1 = 0$

C. $4x^2 + 10x - 5 = 0$

D. $4x^2 + 12x + 9 = 0$

$$b^2 - 4ac$$

a) $25 - 4(3)(7) = -59$

c) $100 - 4(4)(-5) = 180$

b) $4 - 4(3)(-1) = 16$

d) $144 - 4(4)(9) = 0$

51. The quadratic equation $ax^2 - 3x - 2 = 0$ has a discriminant of -7 . What is the value of a ?

A. -2

B. -1

C. 1

D. 2

$$(-3)^2 - 4a(-2) = -7$$

$$9 + 8a = -7$$

$$8a = -16$$

$$a = -2$$

53. What are the solutions to the equation $x^2 - 2x + 3 = 0$?

A. $x = 1 \pm \sqrt{2}$

B. $x = 1 \pm \sqrt{2}i$

C. $x = 3$ and $x = 1$

D. $x = -3$ and $x = 1$

$$\frac{2 \pm \sqrt{4 - 4(1)(3)}}{2}$$

$$= \frac{2 \pm \sqrt{-8}}{2}$$

$$= \frac{2 \pm 2i\sqrt{2}}{2} = 1 \pm i\sqrt{2}$$

54. Find the solutions to the quadratic equation $2x^2 + 4x - 3 = 0$.

$$\frac{-4 \pm \sqrt{16 - 4(2)(-3)}}{2 \cdot 2}$$

$$= \frac{-4 \pm \sqrt{40}}{4}$$

$$= \frac{-4 \pm 2\sqrt{10}}{4}$$

$$= \frac{-2 \pm \sqrt{10}}{2}$$